

FIGURE 1

NZ MASK: Implant subcollector

432

10 ~ Second implant

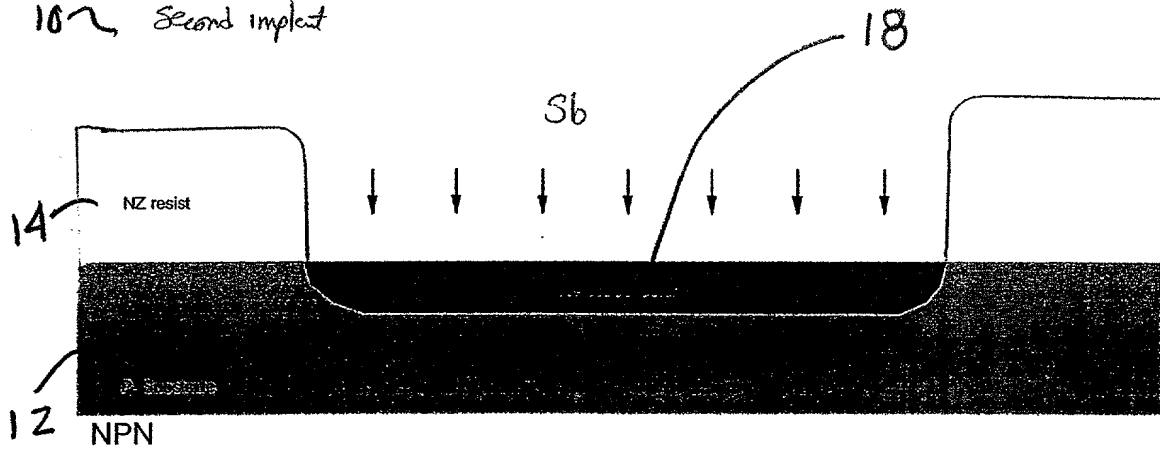


FIGURE 2

FOOTNOTES

After N- EPI

102

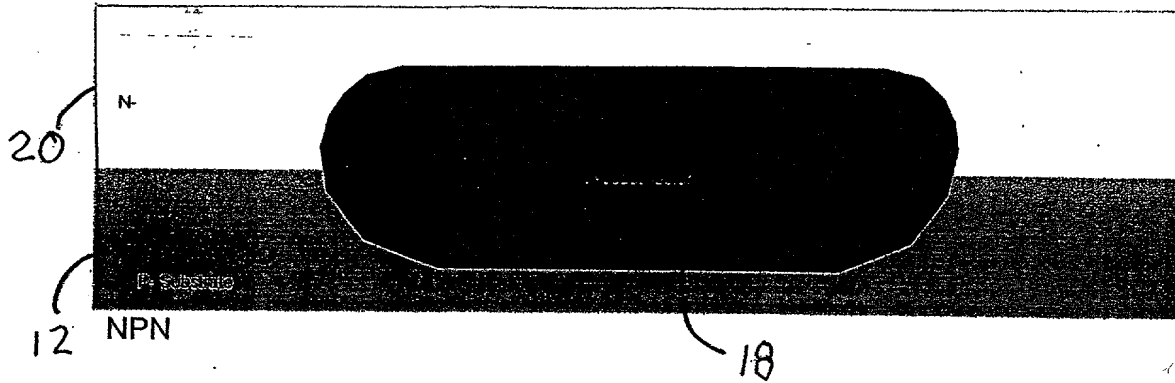


FIGURE 3

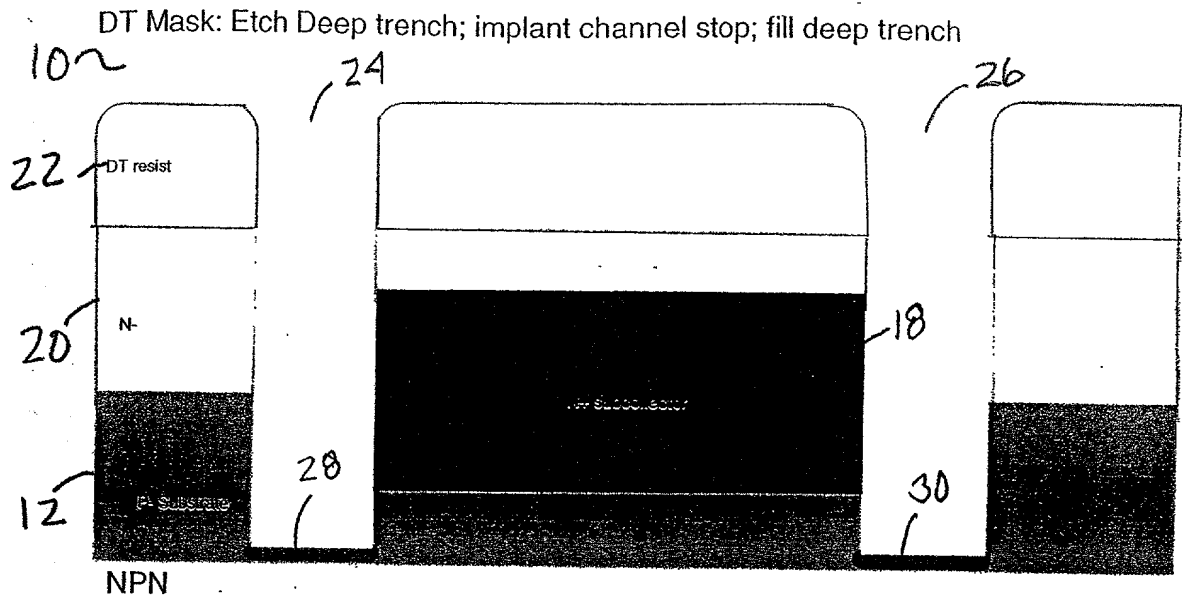


FIGURE 4

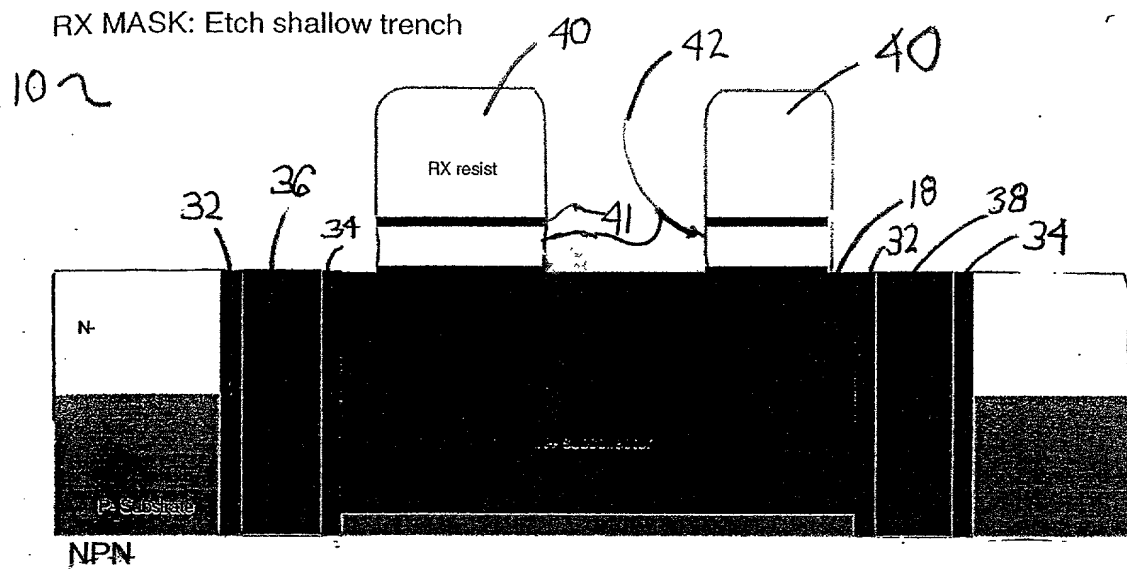


FIGURE 5

A cross-sectional view of a semiconductor device, specifically an NPN transistor. The device is built on a P-substrate. A central N- region is shown, flanked by N+ regions. The top surface features a layer labeled 50, with two specific areas labeled 41. The bottom of the device is labeled NPN.

FIGURE 6

-108



FIGURE 7

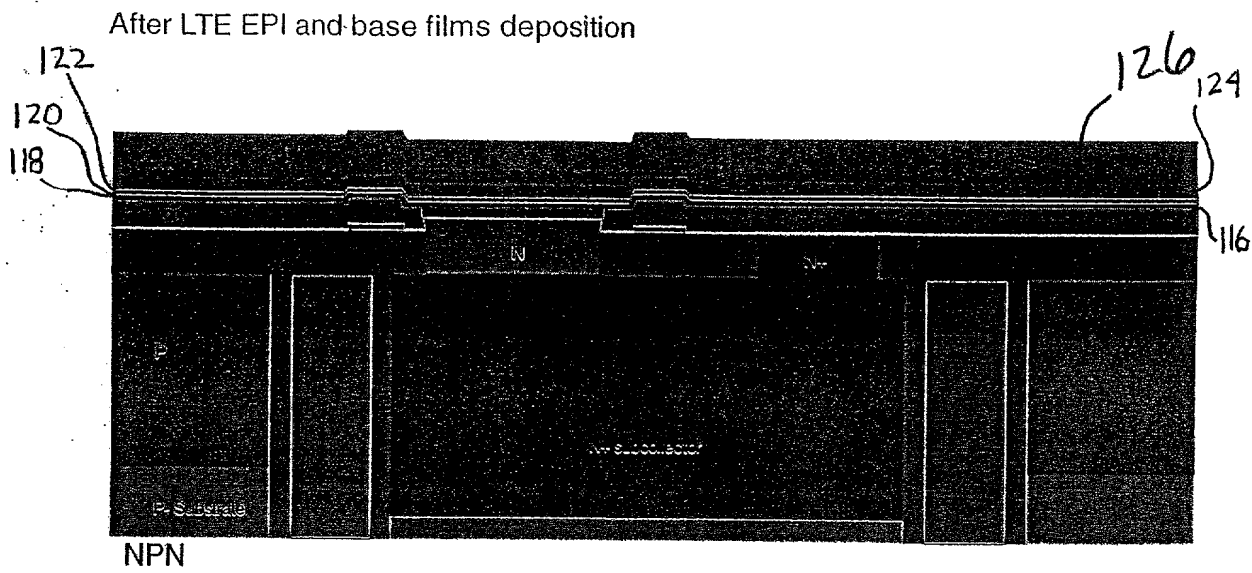


FIGURE 8



EN MASK: Define emitter and extrinsic base

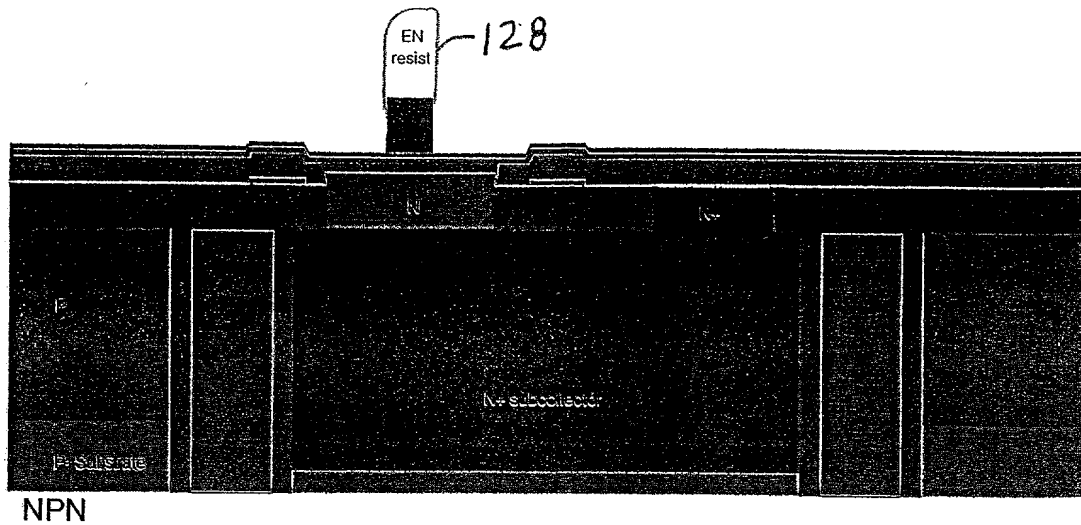


FIGURE 9

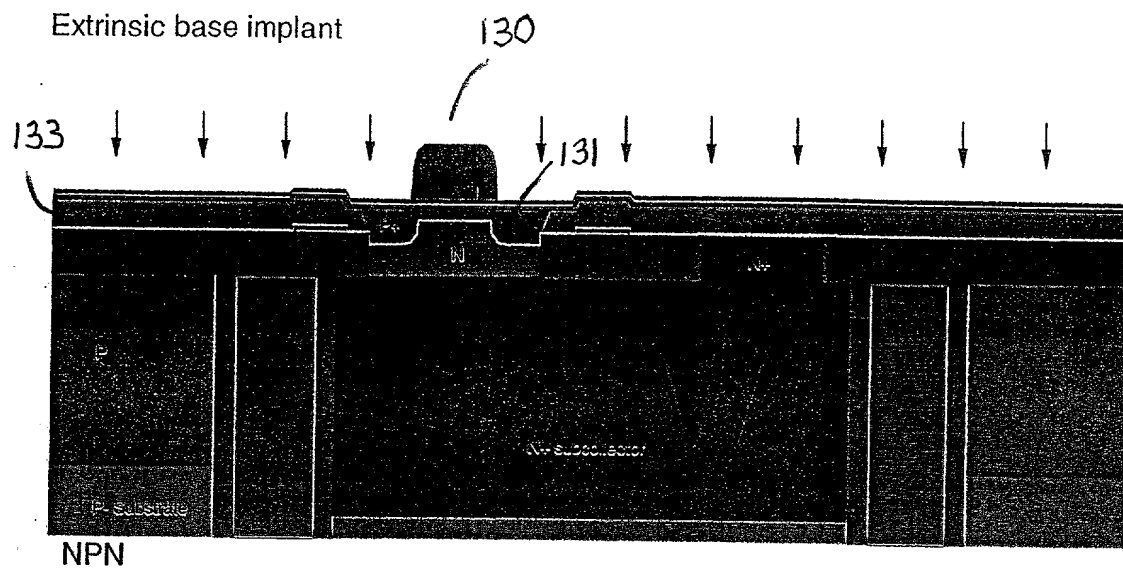


FIGURE 10

Etch emitter opening

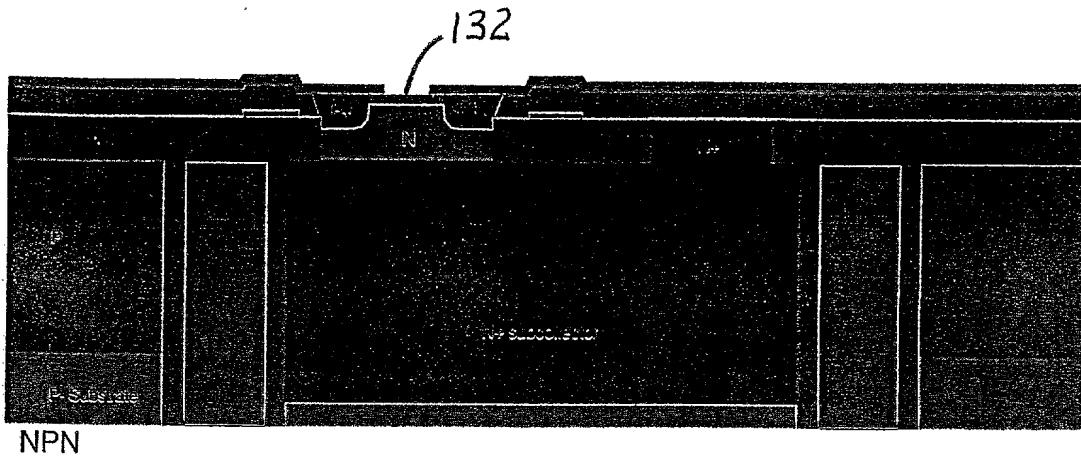


FIGURE 11

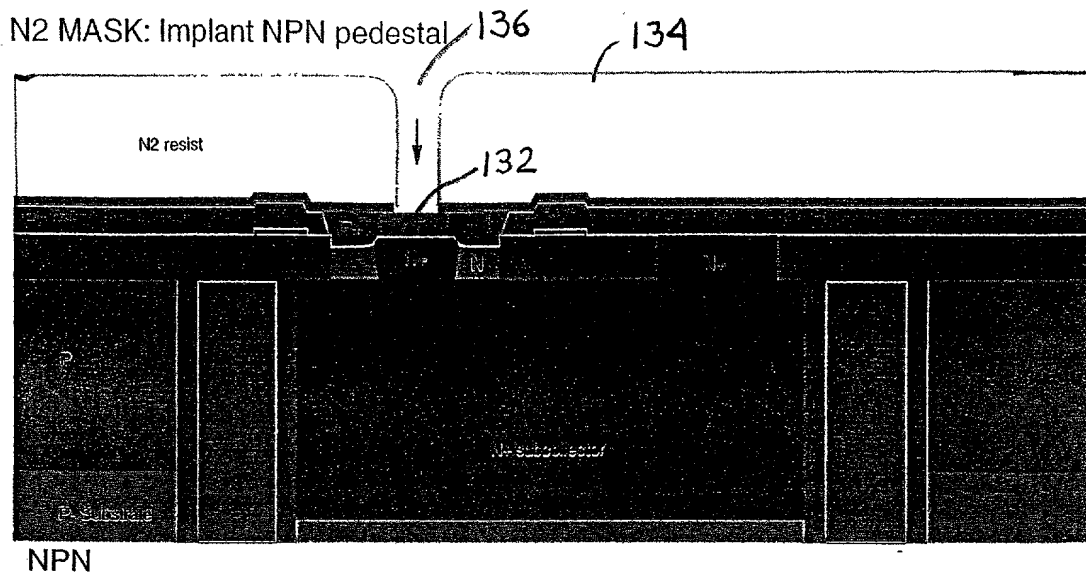


FIGURE 12

NP MASK: Etch NPN emitter poly and emitter films

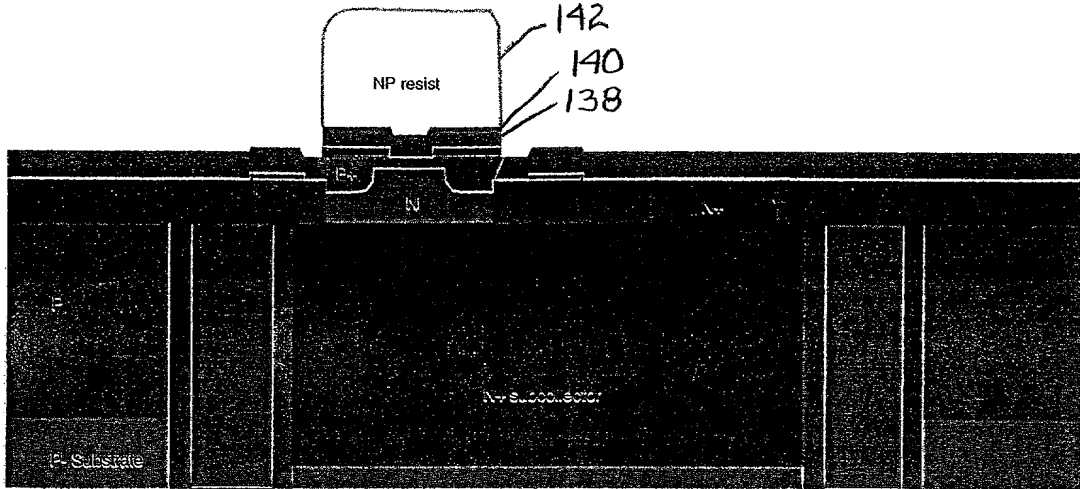


FIGURE 13

PB MASK: Etch NPN base poly and FET protect oxide

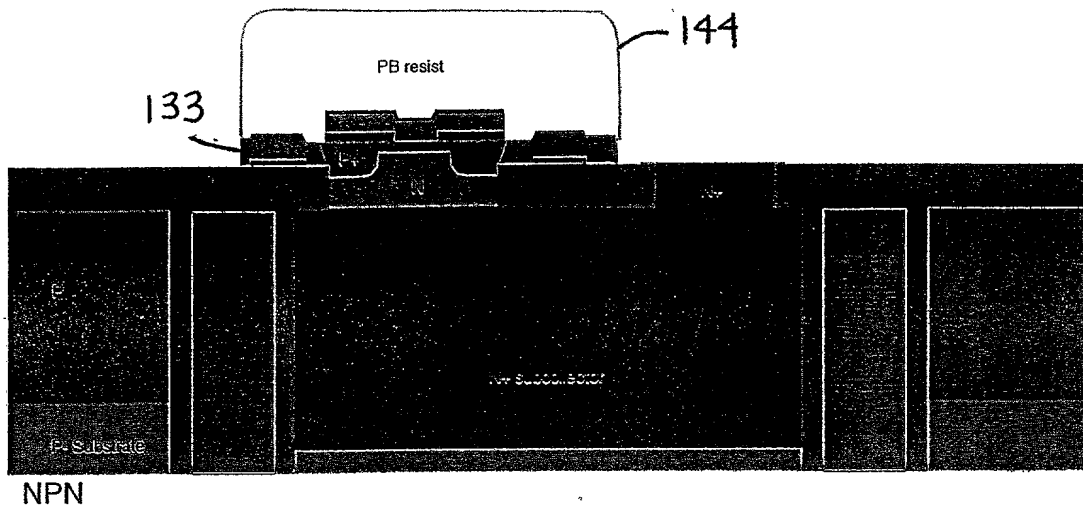


FIGURE 14

OP MASK: Form NPN spacer and resistor TiSix block

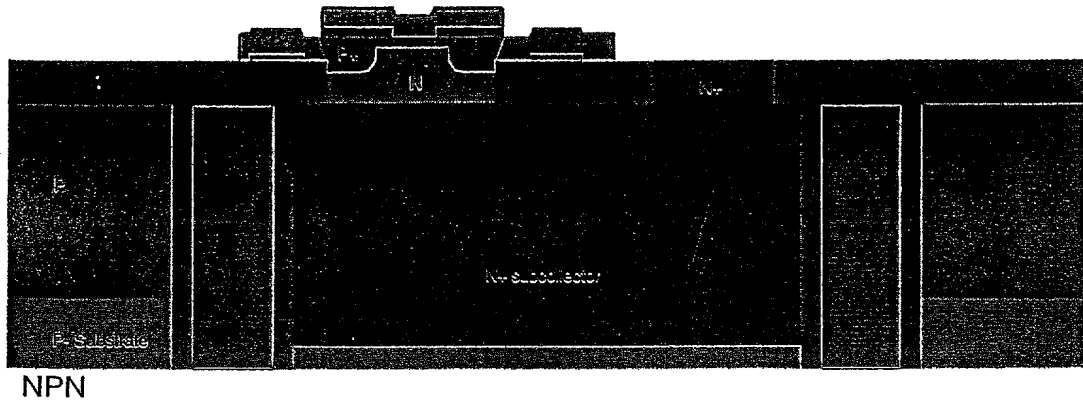
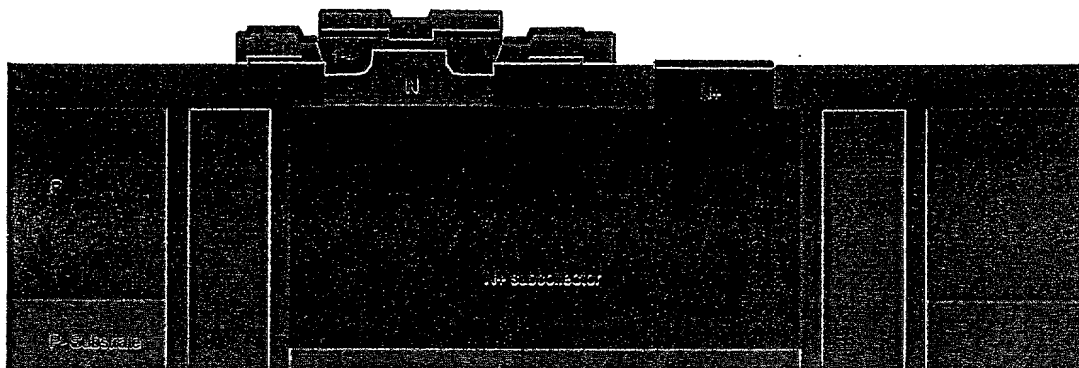


FIGURE 15

After TiSix Formation



NPN

FIGURE 16



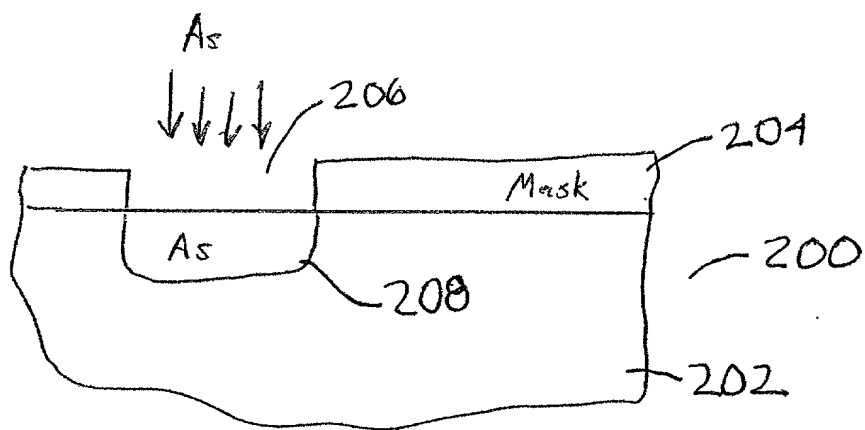


FIGURE 17

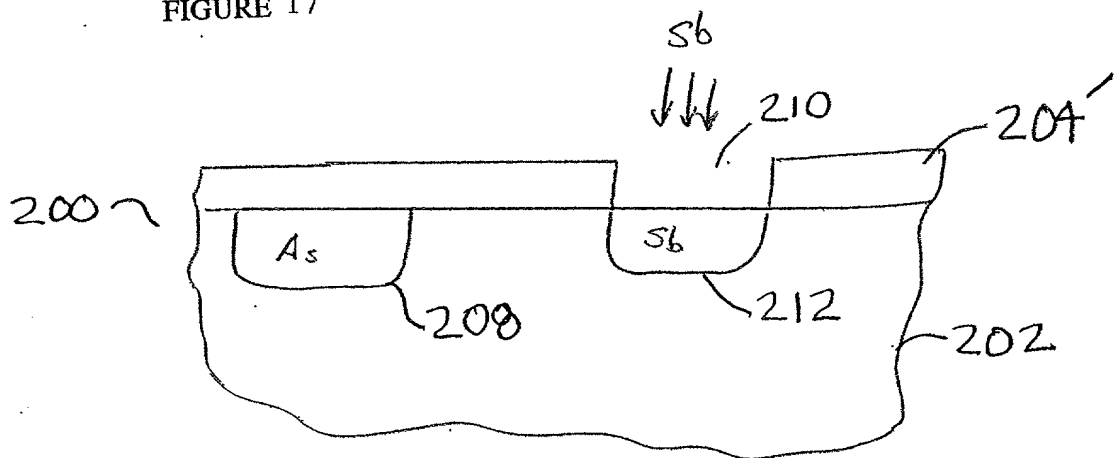


FIGURE 18

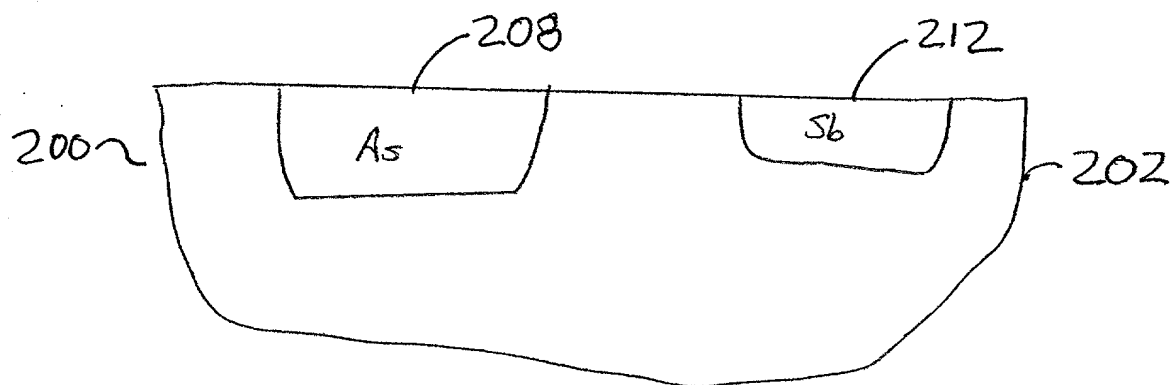


FIGURE 19

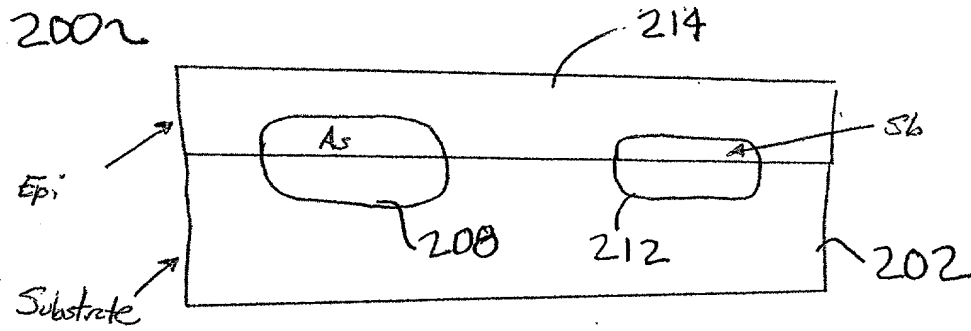


FIGURE 20

TOPTT 244T6660

# SiGe HBT Transistor

---

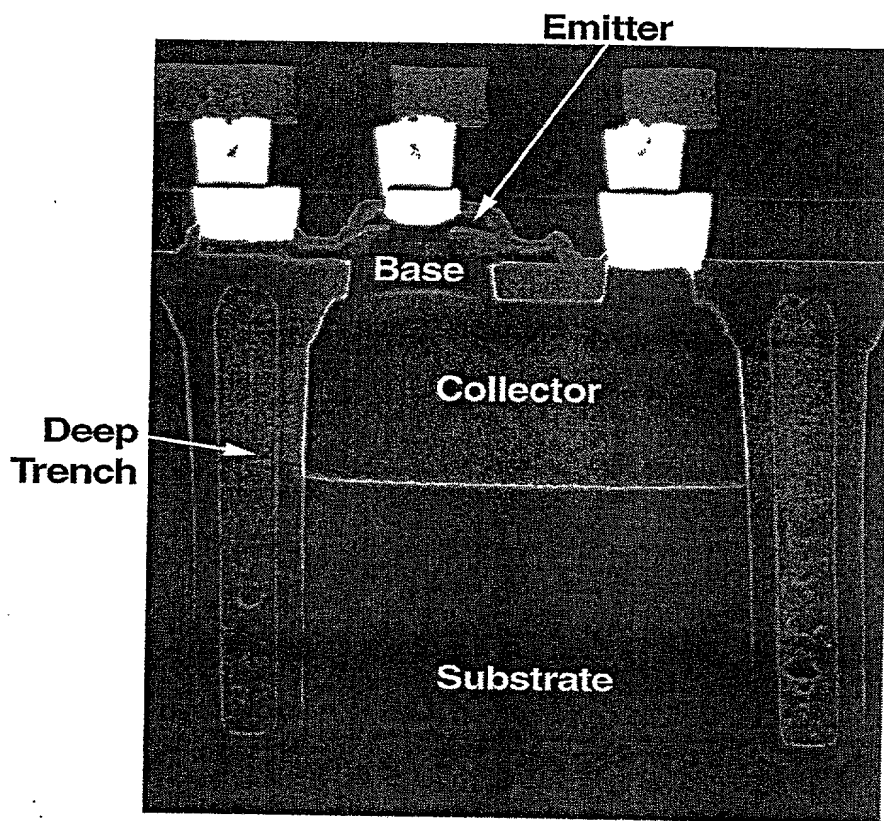
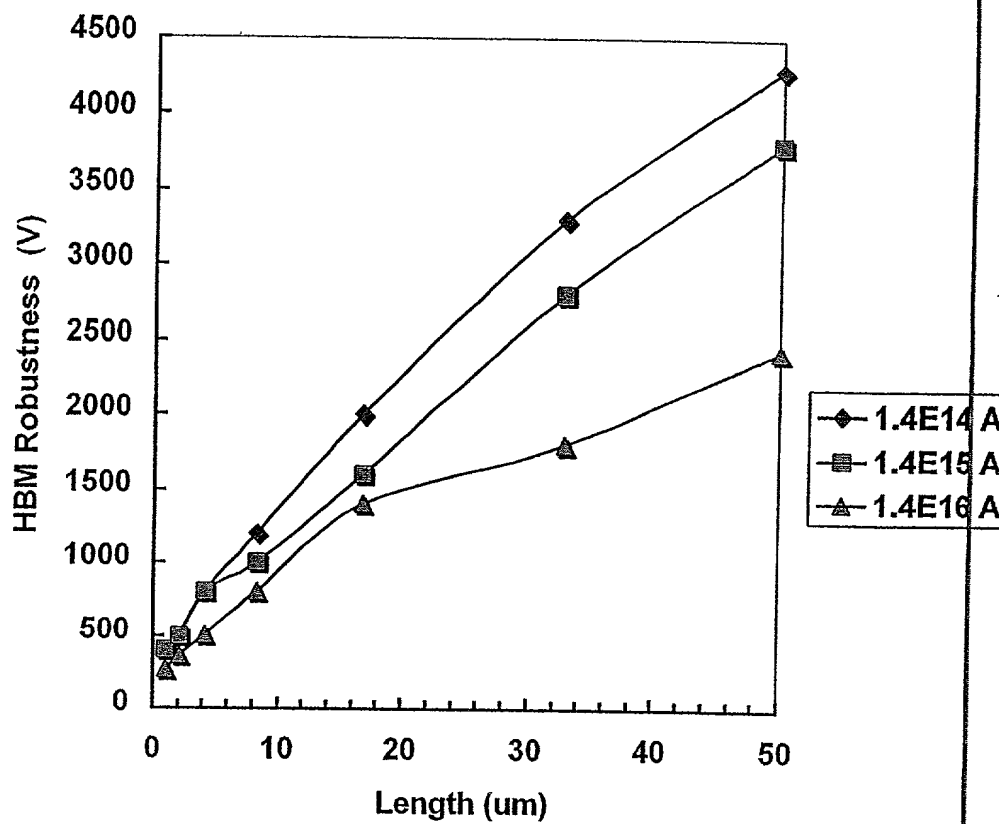
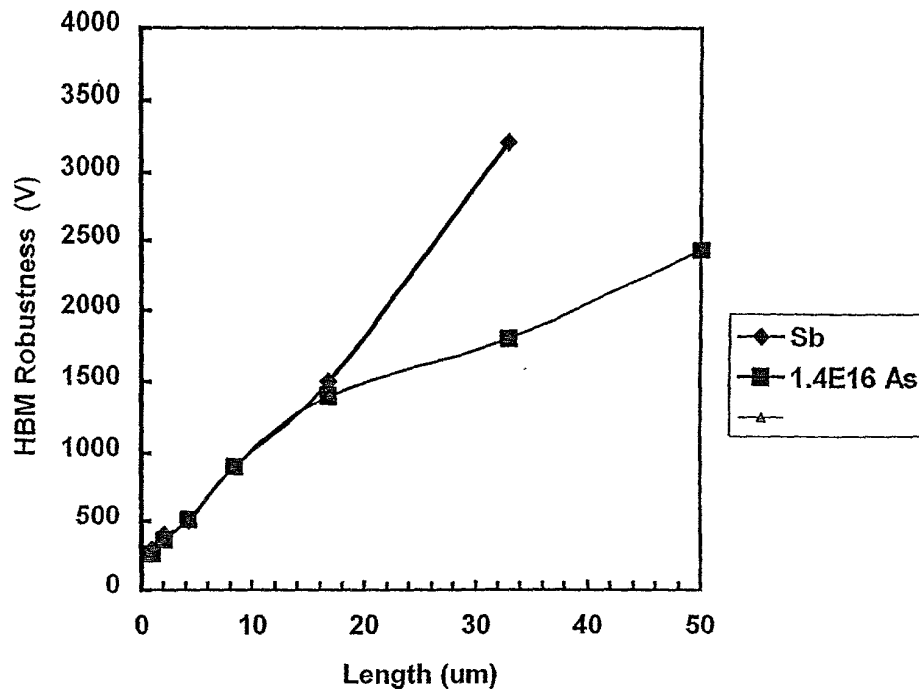


FIGURE 21



Base-Collector ESD Robustness of SiGe HBT for Different Epitaxial Subcollector Doses.

FIGURE 22



ESD Robustness of a SiGe HBT for Epitaxial As and Sb Subcollectors

FIGURE 23

Varactor Width (um)	Varactor Length (1 um)	POR As Subcollector HBM Results POSITIVE HBM PULSE	Sb Subcollector HBM Results POSITIVE HBM PULSE
0.32	1.0	270 -300 V	400-700 V
0.32	2.1	360-390 V	500-600 V
0.32	4.2	510-570 V	800 V
0.32	8.4	540-900 V	1100-1300 V
0.32	16.8	570-1560 V	1300-2100 V
0.32	33	540 - 570 V	3500-3700 V
0.32	50	2610-2670 V	3700-4300 V
0.44	50	2700-2800 V	4000-4200 V

ESD Results of Sb SiGe Varactor Structure vs As SiGe varactor ( No pedestal)

FIGURE 24

Varactor Width (um)	Varactor Length (1 um)	POR As Subcollector HBM Results	Sb Subcollector HBM Results
0.32	1.0	120-150 V	300-800 V
0.32	2.1	120 V	300-600 V
0.32	4.2	120-150 V	300 V
0.32	8.4	150 V	200-300 V
0.32	16.8	150 V	300-700 V
0.32	33	150 V	300-900 V
0.32	50	150 V	400-1400 V
0.44	50	150 V	400-2100 V

ESD Results of Sb SiGe Varactor Structure vs As SiGe varactor ( No pedestal)

FIGURE 25

For "atf" 09/09/00